

What is Claimed is:

1. A method for (co)polymerization of ethylene which is carried out in the presence of (a) and (b) below:

5 (a) a solid titanium complex catalyst prepared by a method comprising the steps of:

(i) preparing a magnesium solution by contacting halogenated magnesium compounds with alcohol;

10 (ii) reacting the magnesium solution with ester compound having at least one hydroxyl group and silicon compound having alkoxy group;

(iii) preparing a solid titanium catalyst component by reacting the product from step (ii) with a mixture of titanium compound and haloalkane compound; and

15 (iv) producing a solid titanium complex catalyst by reacting the solid titanium catalyst component with a mixture of aluminum compound and haloalkane compound, or with haloalkane,

(b) organometallic compounds in Group II or III of the Periodic Table.

2. The method for (co)polymerization of ethylene according to claim 1, wherein the solid titanium complex catalyst is prepared by a method further comprising a step of reacting the solid titanium catalyst component obtained from the step (iii) with an additional titanium compound at least once.

25 3. The method for (co)polymerization of ethylene according to claim 1 or 2, wherein the ester compound having at least one hydroxyl group is selected from the group consisting of unsaturated fatty acid esters having at least one hydroxyl group, aliphatic mono- or polyesters having at least one hydroxyl group, aromatic esters having at least one hydroxyl group and alicyclic esters having at least one hydroxyl group, and wherein the silicon compound having alkoxy group is a compound represented by the general formula of $R_nSi(OR)_{4-n}$, wherein R is a hydrocarbon group having 1 to 12 carbon atoms, and n is an integer of 1 to 3.

- 17 -

4. The method of (co)polymerization of ethylene according to claim 3, wherein the silicon compound having alkoxy group is selected from the group consisting of dimethyl dimethoxy silane, dimethyl diethoxy silane, diphenyl dimethoxy silane, methyl phenyl methoxy silane, diphenyl diethoxy silane, ethyl trimethoxy silane, vinyl trimethoxy silane, methyl trimethoxy silane, phenyl trimethoxy silane, methyl triethoxy silane, ethyl triethoxy silane, vinyl triethoxy silane, butyl triethoxy silane, phenyl triethoxy silane, ethyl triisopropoxy silane, vinyl tributoxy silane, ethyl silicate, butyl silicate and methyl triaryloxy silane.

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10 5. The method of (co)polymerization of ethylene according to claim 1 or 2, wherein the titanium compound is represented by a general formula of $Ti(OR)_aX_{4-a}$, wherein R is a hydrocarbon group, X is a halogen atom and a is an integer of $0 \leq a \leq 4$, and wherein the haloalkane compound is a compound comprising at least one halogen atom and 1 to 20 carbon atoms, or mixtures thereof.

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20 6. The method of (co)polymerization of ethylene according to claim 5, wherein the titanium compound is selected from the group consisting of $TiCl_4$, $TiBr_4$, TiI_4 , $Ti(OCH_3)Cl_3$, $Ti(OC_2H_5)Cl_3$, $Ti(OC_2H_5)Br_3$, $Ti(O(i-C_4H_9))Br_3$, $Ti(OCH_3)_2Cl_2$, $Ti(OC_2H_5)_2Cl_2$, $Ti(O(i-C_4H_9))_2Cl_2$, $Ti(OC_2H_5)_2Br_2$, $Ti(OCH_3)_4$, $Ti(OC_2H_5)_4$ and $Ti(OC_4H_9)_4$, and wherein the haloalkane compound is selected from the group consisting of monochloromethane, dichloromethane, trichloromethane, tetrachloromethane, monochloroethane, 1,2-dichloroethane, monochloropropane, monochlorobutane, monochloro-sec-butane, monochloro-tert-butane, monochlorocyclohexane, chlorobenzene, monobromomethane, monobromopropane, monobromobutane and monoiodomethane.

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7. The method of (co)polymerization according to claim 1 or 2, wherein the aluminum compound is a compound represented by the general formula of R_nAlX_{3-n} , wherein R is alkyl group having 1 to 20 carbon atoms, X is halogen atom or hydride, and n is 1, 2 or 3, or mixtures thereof.

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8. The method of (co)polymerization according to claim 1 or 2, wherein the organometallic compounds in Group II or III of the Periodic Table are represented by the general formula

- 18 -

of MR_n , wherein M is a metal component selected from the group consisting of magnesium, calcium, zinc, boron, aluminum and gallium, R is an alkyl group having 1 to 20 carbon atoms; and n is the valence of the metal component.